Gene expression profiles of immune cells under the influence of bovine trophoblast cell derived extracellular vesicles

Ana C. Silva[1], Kira P. Morgado[1], Christopher J. Davies[1,2], Irina A. Polejaeva[1] and Heloisa M. Rutigliano[1,2]

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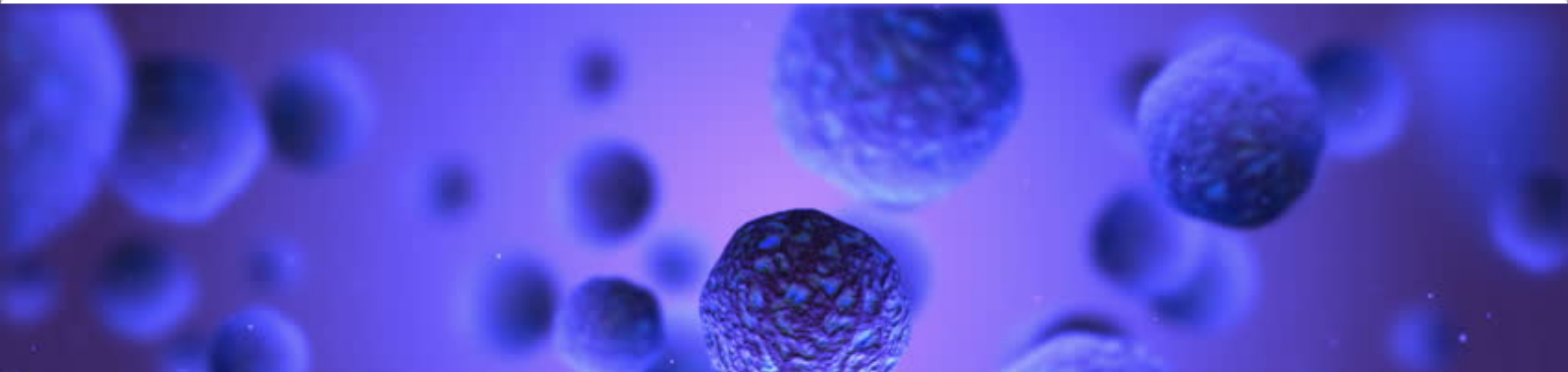
SRS Student Research Symposium

April 11th, 2019



Introduction

Embryonic loss is an important problem in the cattle industry

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Embryonic and Early Foetal Losses in Cattle and Other Ruminants

MG Diskin and DG Morris

Teagasc, Animal Production Research Centre, Mellows Campus, Athenry, Co. Galway, Ireland

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Review article

Pivotal periods for pregnancy loss during the first trimester of gestation in lactating dairy cows

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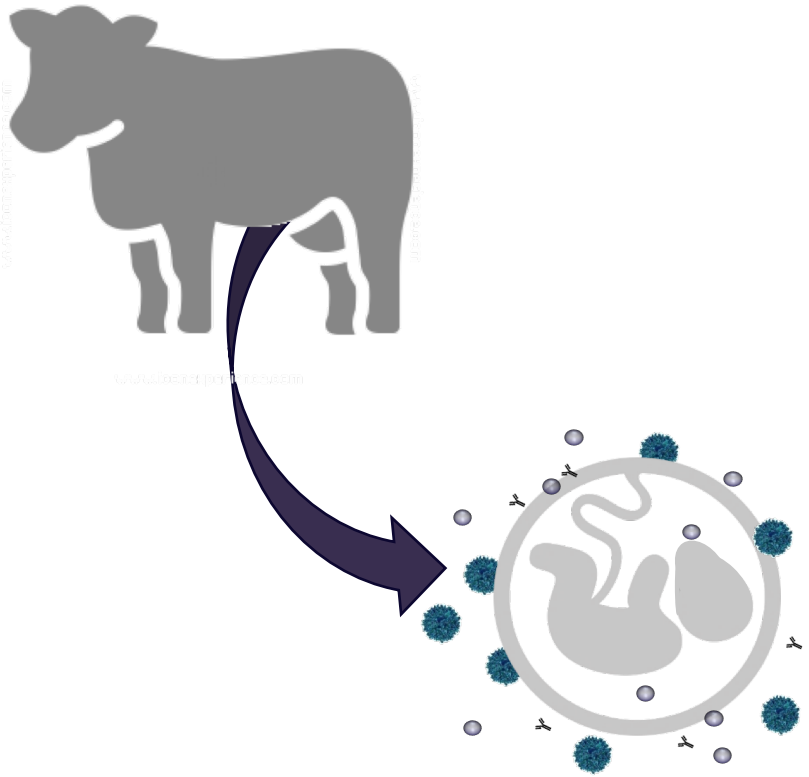
Introduction

Embryonic loss is an important problem in the cattle industry

Understanding of mechanisms that regulate placental and embryonic development is relevant to this industry

Immune regulatory interactions between placental and maternal immune cells

Fetal-maternal cross-talk ➡ Release and uptake of EVs



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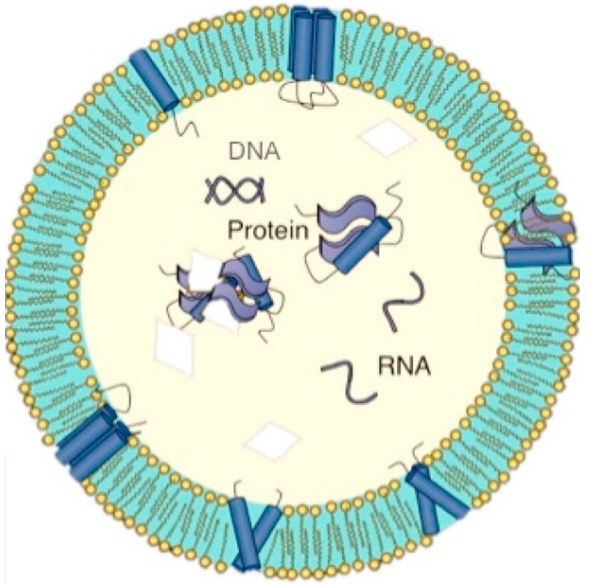
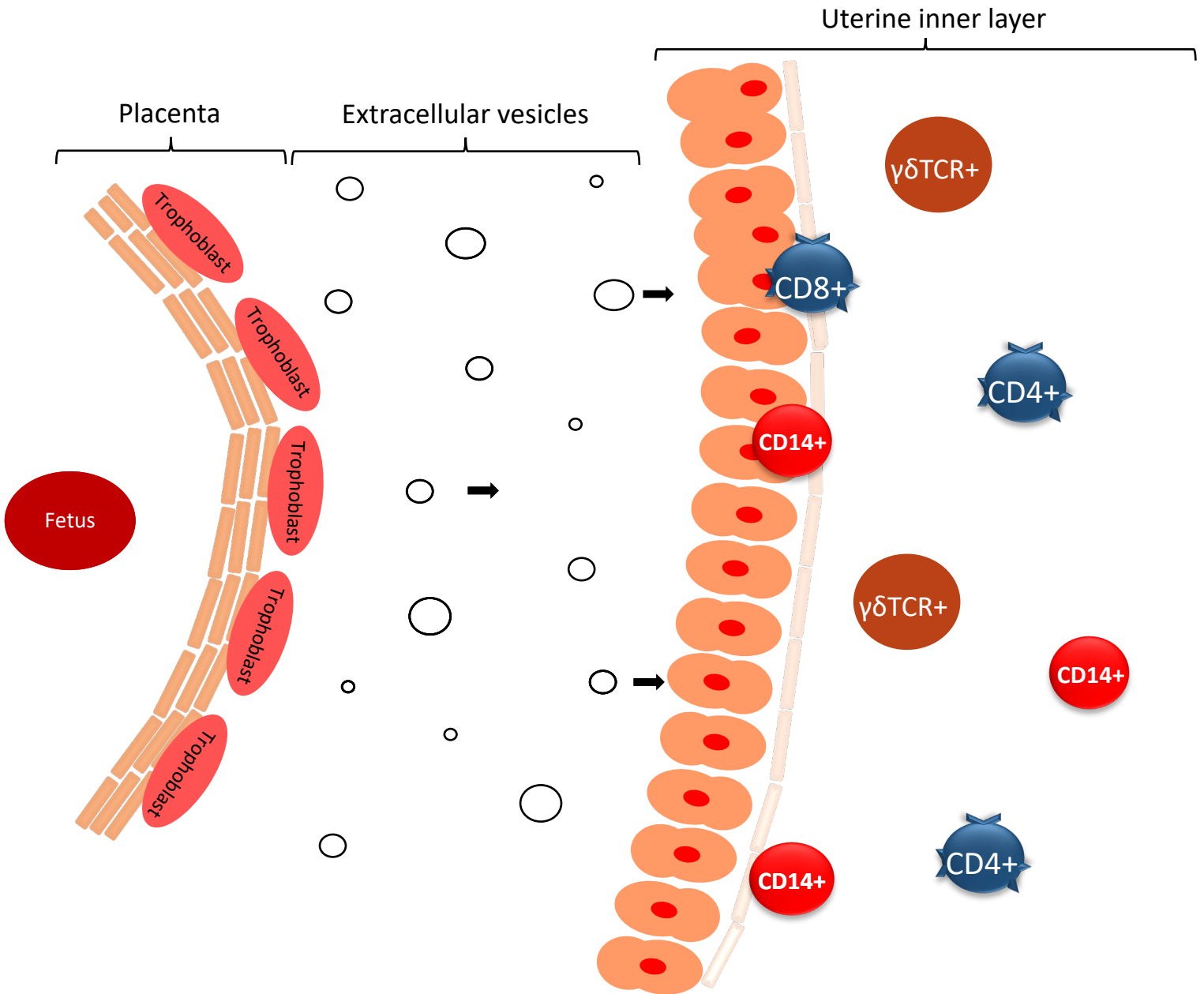


Extracellular vesicle*

*Monguio-Tortajada et al., 2014

Hypothesis

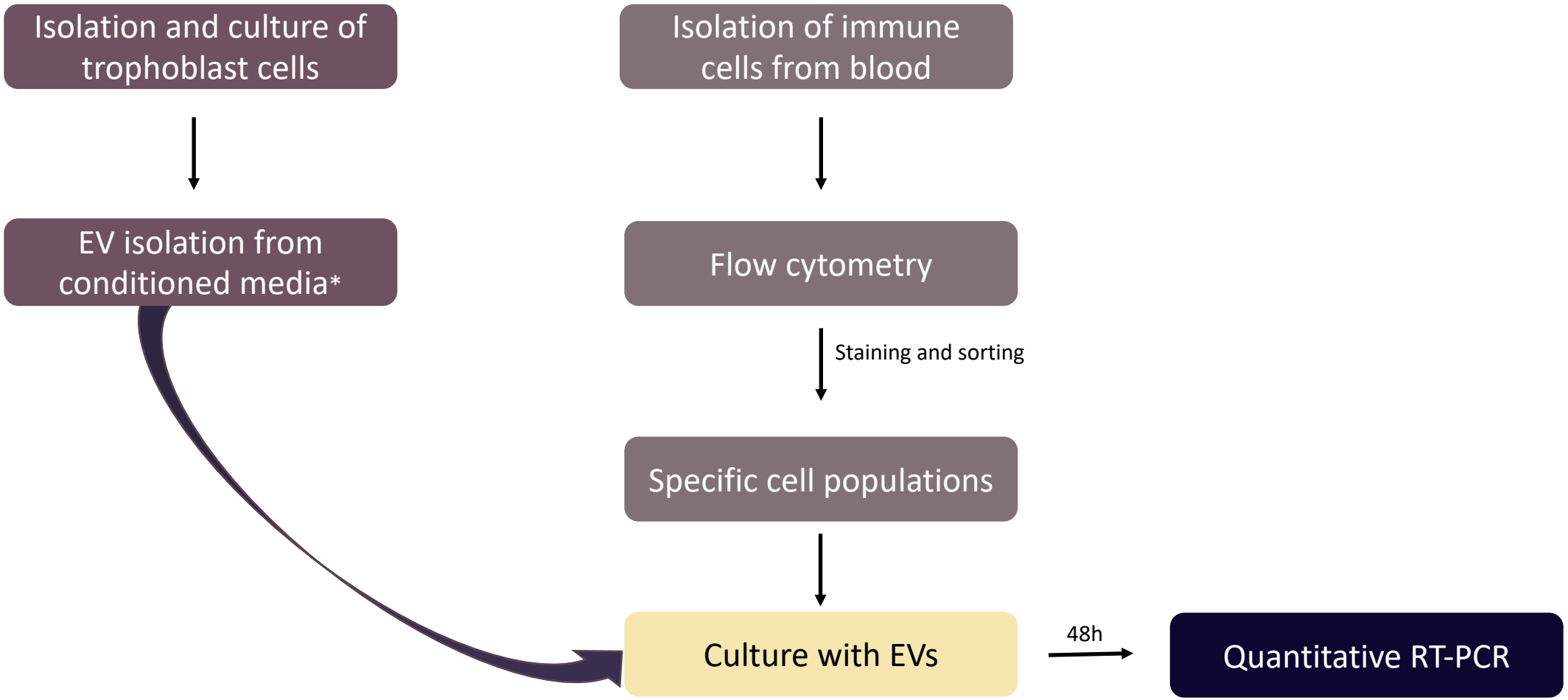


Changes in the gene expression profile of maternal immune cells

- IL-1
- IL-2
- IL-4
- IL-5
- IL-6
- IL-8
- IL-10
- IL12
- IL-13
- IL-15
- IL-17
- IL-18
- IL-23
- IFN-γ
- TNF-α
- TGF-β
- GM-CSF
- FoxP3
- T-bet
- GATA-3
- CD25
- CD28
- CD152

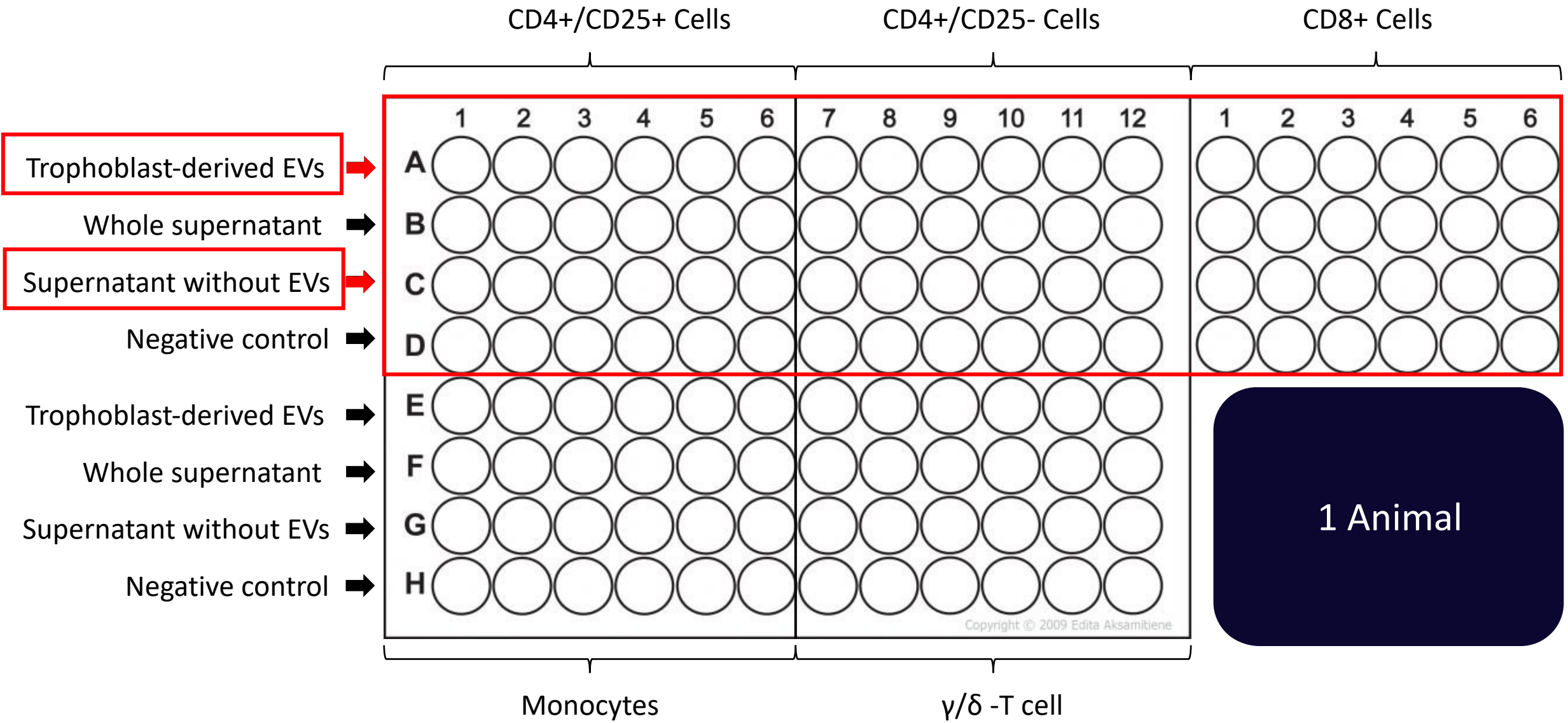
Methods

Goal: Determine gene expression profile of immune cells under influence of placental EV

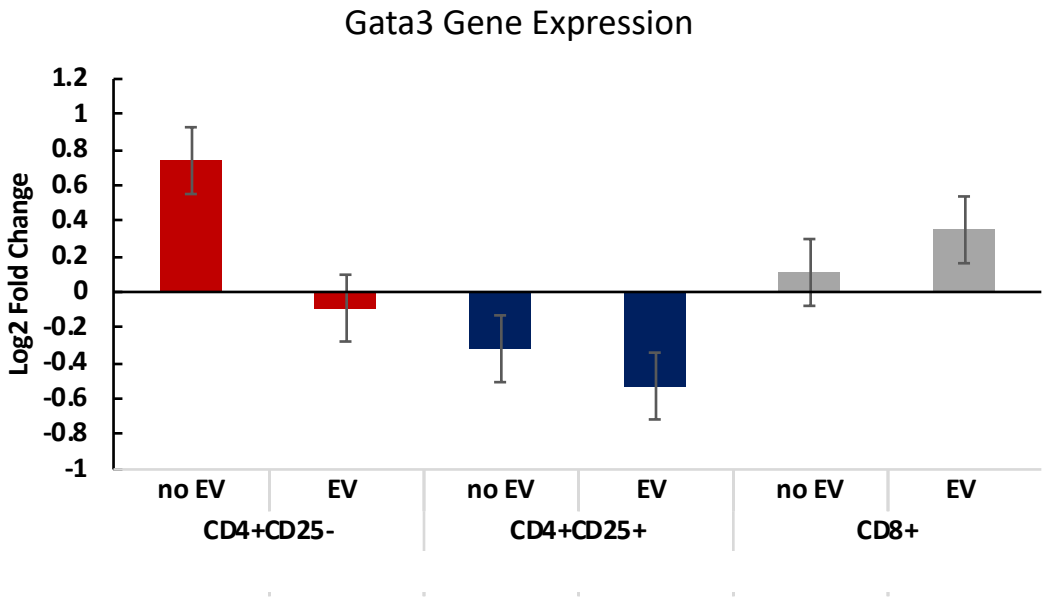


*Théry *et al.*, 2006

Experimental Design



Results

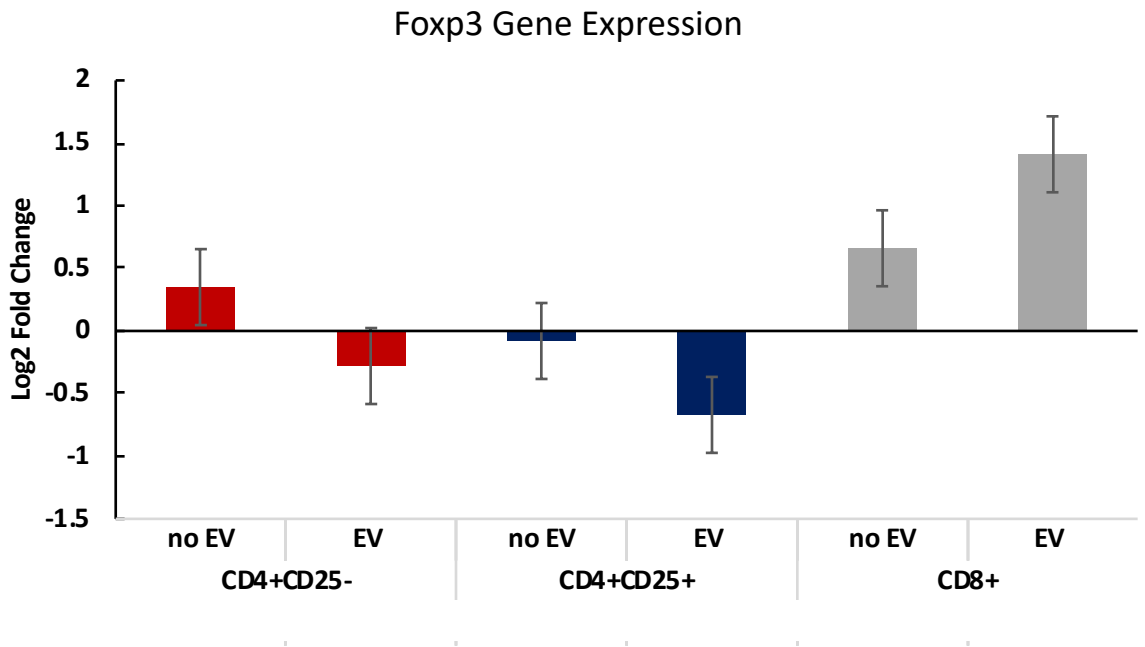


Suppress cell-mediated immunity

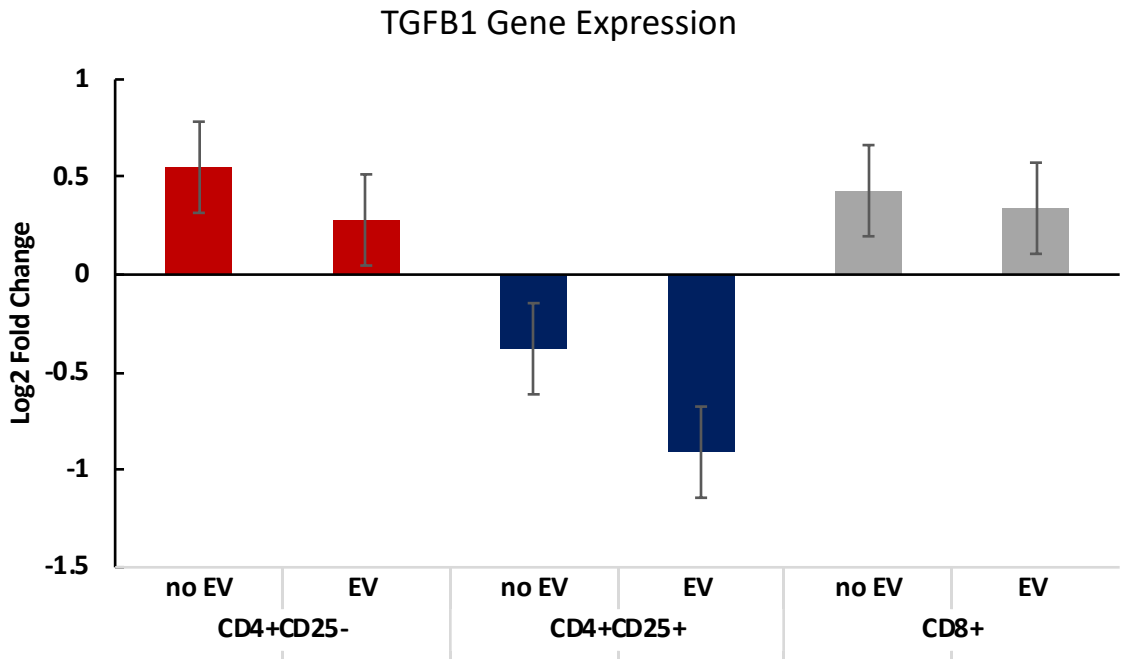
CD4+CD25-	Downregulated
CD4+CD25+	Downregulated
CD8+	Upregulated

Suppress cell-mediated immunity

CD4+CD25-	Downregulated
CD4+CD25+	Downregulated
CD8+	Upregulated



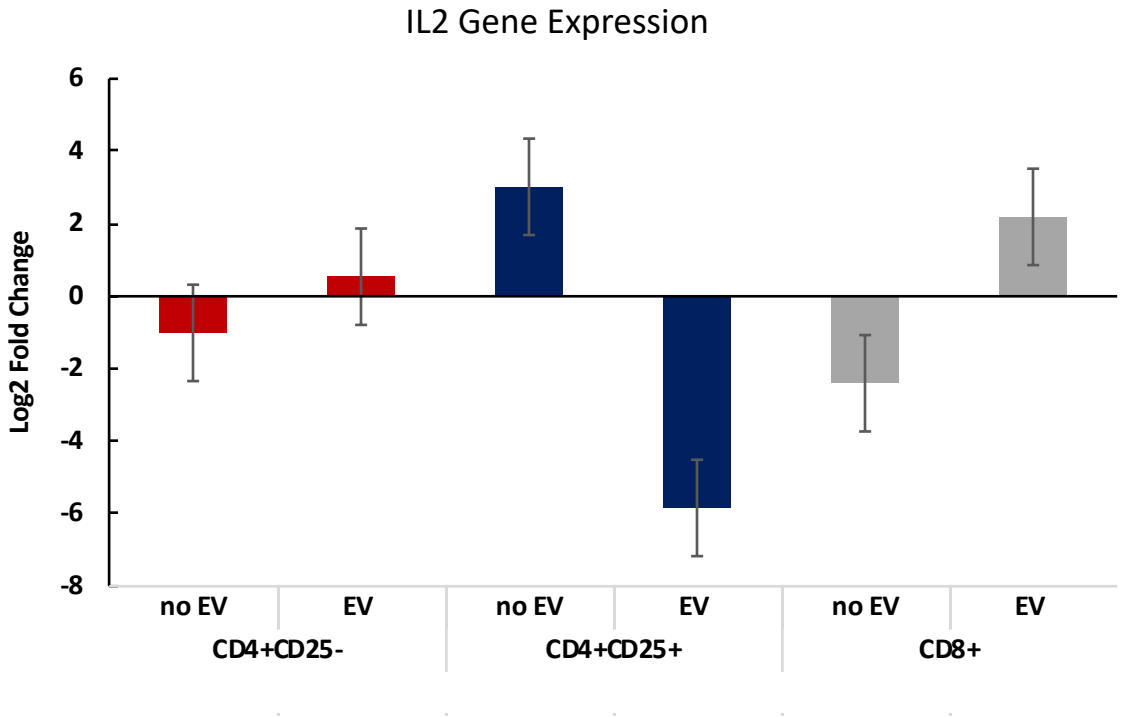
Results



Suppress cell-mediated immunity

CD4+CD25-	Downregulated
CD4+CD25+	Downregulated
CD8+	No change

Results

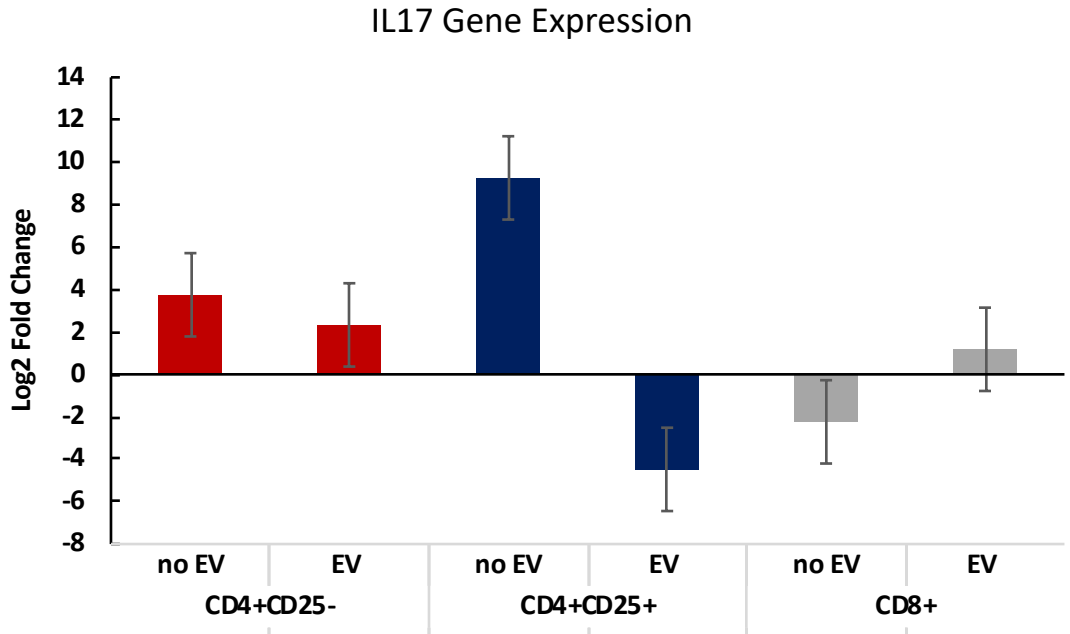


Stimulate cell-mediated immunity

CD4+CD25-	No change
CD4+CD25+	Downregulated
CD8+	Upregulated

Stimulate cell-mediated immunity

CD4+CD25-	No change
CD4+CD25+	Downregulated
CD8	Upregulated



Summary

Trophoblast-derived EVs modulate immune cells gene expression

Trophoblast-derived EVs are potentially related to shift from a stimulant to a suppressive immune response

Trophoblast-derived EVs most likely are important agents to regulate a successful pregnancy

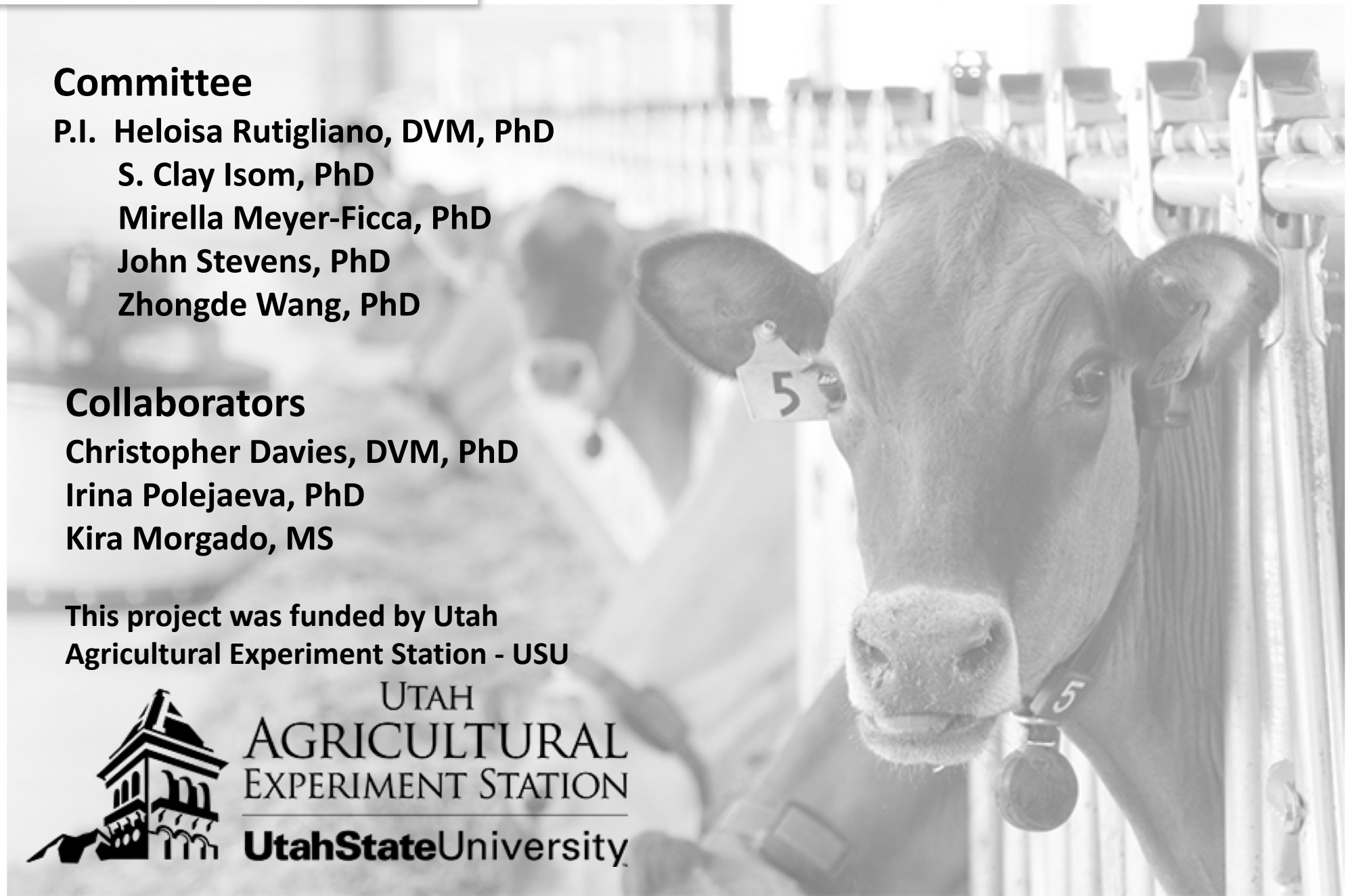
USU Extension Photo Gallery

Future directions

Perform quantitative RT-PCR of four more animals

If results are consistent, design and perform *in vivo* experiment

Acknowledgements



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UtahStateUniversity

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